ARTICLE | OPEN ACCESS

Medical Science

To Cite:
Batih I. Prevalence of maxillofacial anomalies and their relation to periodontal diseases in young people. *Medical Science* 2024; 28: e3ms3256 doi: https://doi.org/10.54905/disssi.v28i143.e3ms3256

Authors' Affiliation:
Bukovinian State Medical University, Chernivtsi, Ukraine

*Corresponding Author
Bukovinian State Medical University, Chernivtsi, Ukraine
Email: inter.project@bsmu.edu.ua
ORCID: 0000-0002-8498-921X

Peer-Review History
Received: 16 November 2023
Reviewed & Revised: 20/November/2023 to 13/January/2024
Accepted: 19 January 2024
Published: 23 January 2024

Peer-review Method
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367

DISCOVERY SCIENTIFIC SOCIETY

Prevalence of maxillofacial anomalies and their relation to periodontal diseases in young people

Iryna Batih*

ABSTRACT

Today, the prevalence of maxillofacial disorders that require orthodontic treatment is increasing, both in Ukraine and in various countries of the world. The presence of anomalies of the bite and teeth position in children is a risk factor for the subsequent development of the lesions of hard tooth tissues and the periodontium. Therefore, it is essential to detect early manifestations of orthodontic pathology for earlier and more effective orthodontic treatment in the complex treatment of generalized periodontitis in such patients. The study aimed to determine the prevalence of the early manifestations of maxillofacial anomalies and associated periodontal disease in young people. We examined 224 young people (18-35 years old) who sought dental care for various dental diseases, 120 young people with periodontal diseases, and 76 people with various maxillofacial deformities. The examination shows that the presence of lesions of hard tooth tissues, to some extent, contributes to the development of periodontal lesions and the formation of traumatic occlusion. The presence of generalized periodontitis and premature contact of the teeth led to the malposition of the teeth in 106 (88.33%) patients. Periodontal diseases were found in all patients with maxillofacial anomalies. The conducted study showed the presence of initial malposition of teeth in almost all patients with generalized periodontitis. In the future, this can lead to the formation of maxillofacial anomalies and deformations in patients with generalized periodontitis.

Keywords: Maxillofacial anomalies, deformations, periodontal disease, orthodontic treatment

1. INTRODUCTION

Conducted examinations of people of various ages revealed a significant prevalence of maxillofacial anomalies and deformations. The relevance of this problem lies in their considerable number and significant negative impact on the maxillofacial system and, especially, on the periodontal tissues. Today, the

prevalence of disorders of the maxillofacial area that require orthodontic treatment is increasing, both in Ukraine and in various countries of the world. In the world, in particular, the prevalence of maxillofacial anomalies reaches 68.0% among children and adolescents (Laganà et al., 2017; Khan et al., 2015; Roslan et al., 2018; Aren et al., 2015; Balija et al., 2022; Baron et al., 2018). A similar prevalence is reported in Ukraine (Hodovanyi et al., 2019). The presence of anomalies in the position of the teeth and bite in children is a risk factor for the subsequent development of lesions of the hard tissues of the teeth and the periodontium (Cai et al., 2018; Sim et al., 2017). That leads to the appearance of a significant number of periodontal lesions - from 37.0% to more than 50.0% of cases.

Orthodontic treatment can enhance facial aesthetics and improve mastication by aligning teeth. However, it may lead to complications such as dental caries, tooth discoloration, and gingival hyperplasia, as reported in the literature. The presence of orthodontic appliances, bands, and elastics can make oral hygiene challenging, leading to plaque accumulation and changes in oral bacteria composition and type (Chapple et al., 2018; Saloux et al., 2022). Orthodontic treatment may have a negative effect on the periodontium in patients with generalised periodontitis. However, the use of removable orthodontic appliances can reduce this impact. Therefore, it is important to initiate orthodontic treatment as early as possible, before significant manifestations of traumatic occlusion and pronounced tooth malposition have developed. It is important to note that orthodontic equipment, especially when used with excessive force, can cause injury to periodontal tissues. Therefore, orthodontic treatment carries certain risks and can create biological problems for the maxillofacial system (Cao et al., 2015; Antoun et al., 2017; Wishney, 2017). The number of such complications is significant and varies from 30.0% to more than 50.0% of cases (Cai et al., 2018).

It is important to consider the significant duration of orthodontic treatment, which averages 20-24 months in patients with periodontal disease, even when using braces. Additionally, a longer retention period is necessary to avoid a high risk of relapse (Athanasiou et al., 2017; Kaklamanos et al., 2017; Panwar et al., 2014; Tsichlaki et al., 2016). The analysis showed many abnormalities in patients with periodontal diseases in the position of teeth and bites. According to the literature, orthodontic treatment of such pronounced anomalies requires a significant time and an extended retention period (Atik et al., 2017; Naraghi et al., 2021). Considering this, it was more important to detect early manifestations of orthodontic pathology for more effective orthodontic treatment in the complex treatment of generalized periodontitis in such patients. Thus, it was necessary to determine the prevalence of early maxillofacial anomalies and associated periodontal lesions in young individuals.

Objective

To determine the prevalence of early manifestations of maxillofacial anomalies and related periodontal lesions in young people.

2. MATERIALS AND METHODS

The study comprised 420 participants aged 18-35 years, including 224 individuals seeking dental care for various dental diseases (Group I), 120 patients with periodontal diseases (Group II), and 76 individuals (Group III) with maxillofacial deformities (Figure 1).

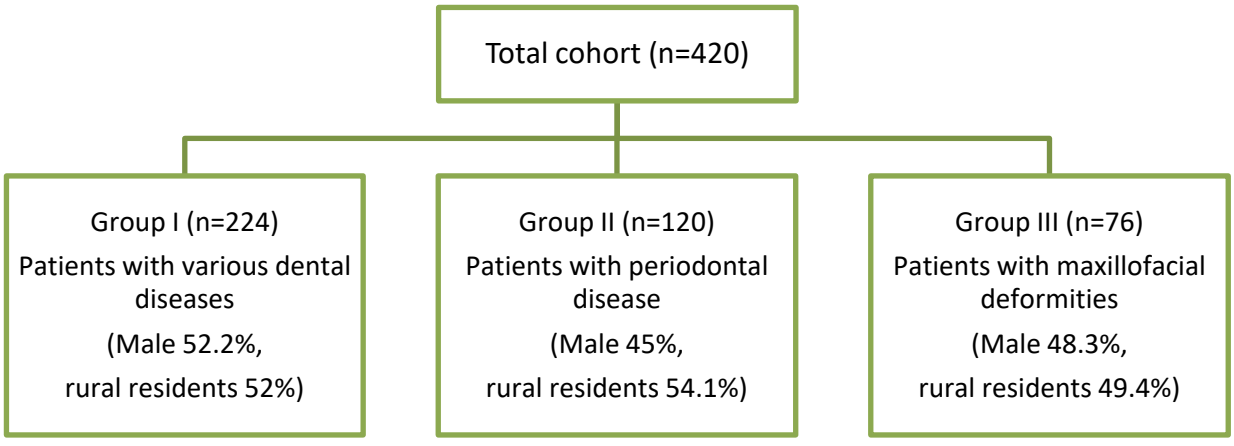

Figure 1 Demographic characteristics of study participants

All patients underwent a comprehensive examination of their oral cavity, including evaluation of the hard tissues of the teeth, periodontium, and mucous membrane. Additionally, the presence of maxillofacial deformities was assessed by evaluating the condition of the jaws, position of the teeth, shape of the dental arches, and bite. To evaluate the ratio of teeth and dental arches in the periodontal examination, we detected premature contacts (supra-contacts) and changes in tooth position using copy paper. In some cases, we also performed contact radiography of specific areas of the dentition. Data collection was analysed using Microsoft Excel 2016. A significance level of $P<0.05$ was used. In population analysis, we evaluated the attributive risk (AR), relative risk (RR), and odds ratio (OR), and calculated confidence intervals (CI) for the relative risk and odds ratio (95% CI).

The research was conducted in accordance with the principles of the Declaration of Helsinki, GCH ICH provisions, and the Order of the Ministry of Health of Ukraine dated 23.09.2009 № 690, as amended by the Order of the Ministry of Health of Ukraine dated 12.07.2012 № 523. The study design adhered to the principles of confidentiality and autonomy, as well as the concept of informed consent. The risk/benefit ratio and other ethical principles for research subjects were also taken into account. The research protocol and informed consent form were approved by the Commission on Biomedical ethics in biomedical scientific research of the Bukovinian State Medical University (Protocol No. 1, 09.09.2021).

3. RESULTS

The examination of group I patients who sought dental care for various dental conditions revealed that all 224 individuals (100.0%) had carious lesions of varying depth and activity (acute or chronic) and complications of caries (pulpitis and periodontitis) (Table 1). Among the examined patients, 37 (16.52%) were diagnosed with pulpitis, with 24 (10.71%) having chronic pulpitis and 13 (5.81%) having acute pulpitis. Apical periodontitis was detected in 72 (32.14%) of the patients examined. Of these, 59 (26.33%) had chronic periodontitis, while 13 (5.81%) had acute periodontitis. Upon thorough examination of the periodontal condition, periodontal disease (gingivitis and periodontitis) was found in 92.41% of patients. Of these patients, 196 (87.5%) had generalized periodontitis of initial and first degree, while only 11 (4.91%) of the youngest patients had gingivitis. The risk of periodontitis was significantly higher (OR=7.9, 95% CI: 3.42-18.43; RR=3.7, 95% CI: 3.17-4.43; AR=0.44).

Table 1 Comprehensive dental examination results

Dental pathology	Number of patients		
	Group I (n=224)	Group II (n=120)	Group III (n=76)
Dental caries	224	87	46
Complications of caries	109	23	15
Periodontal disease	207	120	76
Malposition of teeth	76	106	76

Out of the 207 patients diagnosed with periodontal diseases, all showed signs of traumatic occlusion, specifically the presence of premature tooth contact. Among the patients with generalized periodontitis, 76 (33.93%) showed malposition of the frontal group of teeth (Figure 2). Among them, 58 (25.89%) patients exhibited malposition of teeth in the vestibular direction, resulting in the formation of a pathological diastema. In 18 patients (8.04%), malposition of the lower front teeth in the lingual direction was observed.

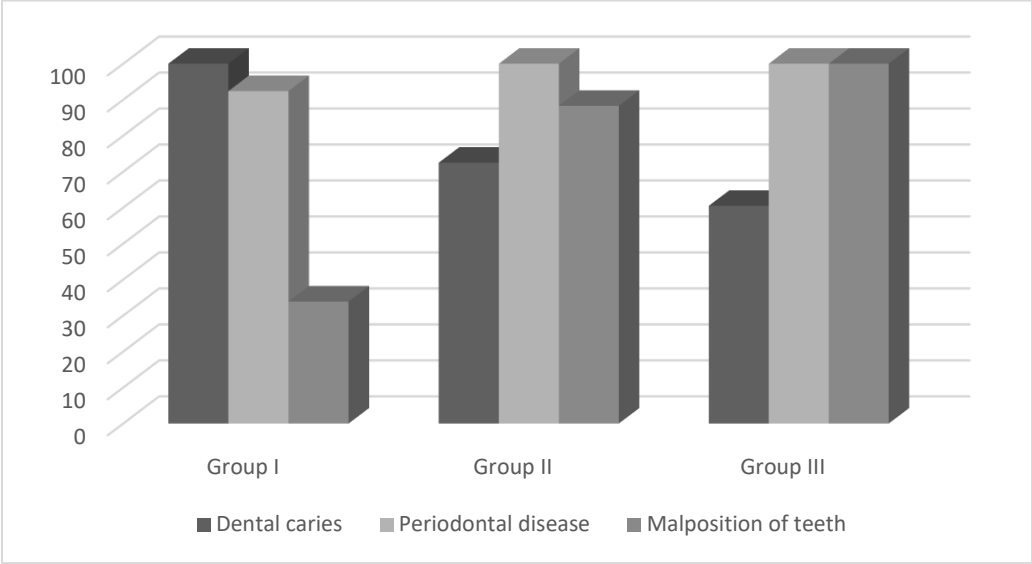

Figure 2 Distribution of maxillofacial anomalies, dental, and periodontal disease, %

The analysis of 120 patients in group II with periodontal disease (generalized periodontitis of the 1st degree) showed that 87 (72.5%) of them had carious lesions of varying depths and activity (acute or chronic). Out of these, 65 (54.17%) had satisfactory quality seals, while 18.33% were either unsealed or had poor-quality fillings. In this study, 23 out of 120 patients (19.17%) were found to have complications of caries, specifically chronic periodontitis in 17 patients (14.17%) and chronic pulpitis in 6 patients (5.0%). Additionally, all 120 patients with generalized periodontitis were found to have premature teeth contacts (supra-contacts). Periodontal disease and supra-contacts can cause malposition of teeth in patients. In 77 (64.17%) patients, malposition of the upper front teeth in the vestibular direction with the formation of a pathological diastema and tremas was detected. This risk was significantly higher compared to the representatives from group I: OR=3.5 (95% CI: 1.95-6.24), RR=1.9 (95% CI: 1.36-2.54), AR=0.30.

Thirteen (10.83%) patients exhibited vestibular malposition of the front teeth, accompanied by a deep overlap. In 29 (24.17%) patients, we observed malposition of the lower frontal teeth in the lingual direction, resulting in deep overlap and crowding. In 106 (88.33%) patients, the combination of generalized periodontitis and premature tooth contact resulted in abnormal tooth positioning. This statement suggests that patients with generalized periodontitis may require orthodontic treatment as part of their overall treatment plan. Out of the 76 patients in group III with various maxillofacial deformities, 46 (60.52%) had caries lesions of different depths and activity (acute or chronic). Of those, 37 (48.68%) had satisfactory quality fillings, while 9 (11.84%) were either unsealed or had poor-quality seals. Fifteen (19.74%) patients were found to have caries complications, specifically chronic periodontitis in 11 (14.47%) and chronic pulpitis in 4 (5.27%).

Additionally, all 76 (100.0%) young people with various maxillofacial deformities were found to have periodontal disease, with 67 (88.16%) having generalized periodontitis and 9 (11.84%) having localized periodontitis. Furthermore, all 76 (100.0%) young people with different maxillofacial deformities had premature contacts (supra-contacts). Therefore, it is indicated that maxillofacial anomalies have a negative impact on periodontal tissues and contribute to the development of pathological diseases, both inflammatory and dystrophic-inflammatory.

4. DISCUSSION

The examination of young people with various diseases and maxillofacial deformities indicates that lesions of the hard tissues of the teeth contribute to the development of periodontal lesions and the formation of traumatic occlusion. According to the literature, periodontal lesions in patients can lead to tooth malposition and pathological bite or maxillofacial deformities. Due to the increasing number of adult patients, orthodontists are increasingly confronted with periodontal problems. Coordination among orthodontists, periodontists, and general dentists is helpful in preventing and treating periodontal diseases. This study found that adults undergoing

orthodontic treatment accounted for 19.9% of orthodontists' patients, but only 2.67% of general dentists' patients. Prior to treatment, orthodontists were less concerned than generalists about bleeding, recessions, increased probing depths, halitosis, and hyperplasia.

During treatment, palpation or probing was never or only occasionally performed by orthodontists in 54.2% and 84.6% of cases. After orthodontic treatment, gingivitis and recessions were the primary reasons for consultations among 22% and 20% of general dentists and periodontists, respectively (Chapple et al., 2018; Saloux et al., 2022). However, a systematic review indicated a positive relationship between malocclusion and periodontitis. Nevertheless, there is no reliable evidence suggesting a positive effect of orthodontic treatment on periodontal health (Sim et al., 2017; Cao et al., 2015). Clinicians often face the challenge of reduced periodontal support when rehabilitating compromised dentition.

Adjunct orthodontic therapy may play an essential role in overcoming these problems due to the close and intricate relationship between the periodontal tissues and the processes of tooth movement. Excessive movement of teeth beyond the anatomic boundaries of the alveolar process is commonly believed to contribute to further destruction of the periodontal tissues (Antoun et al., 2017; Wishney, 2017). The research indicates that almost 100% of patients with generalized periodontitis exhibit the first signs of traumatic occlusion, which can result in maxillofacial deformities. Therefore, early elimination of these signs and orthodontic treatment, if required, can significantly enhance the effectiveness of treatment for this prevalent periodontal disease.

5. CONCLUSIONS

The study revealed that almost all patients with generalized periodontitis had initial teeth malposition, which could lead to dental and jaw anomalies and deformations. Orthodontic treatment for patients with generalized periodontitis is time-consuming, taking several years, as per literature data. Early orthodontic treatment can prevent the development of severe maxillofacial anomalies in patients with generalized periodontitis and improve the effectiveness of their treatment.

Acknowledgement

Author would like to thank all participants of this study.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study.

Ethical approval

The research protocol and informed consent form were approved by the Commission on Biomedical ethics in biomedical scientific research of the Bukovinian State Medical University (Protocol No. 1, 09.09.2021).

Authorship

BI contributed personally for all stages. Author read and agreed to the published version of the manuscript. All data associated with this study are present in the paper.

Funding

This study received no external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES

1. Antoun JS, Mei L, Gibbs K, Farella M. Effect of orthodontic treatment on the periodontal tissues. Periodontol 2000 2017; 74(1):140-157. doi: 10.1111/prd.12194
2. Aren G, Guven Y, Guney Tolgay C, Ozcan I, Bayar OF, Kose TE, Koyuncuoglu G, Ak G. The prevalence of dental anomalies in a Turkish population. J Istanbul Univ Fac Dent 2015; 49(3):23-28. doi: 10.17096/jiufd.86392
3. Athanasiou AE, Kaklamanos EG, Mavreas D, Tsalikis L, Karagiannis V. Treatment duration and gingival inflammation in Angle's Class I malocclusion patients treated with the conventional straight-wire method and the Damon technique: a single centre, randomised clinical trial. J Orthod 2017; 44(2):75-81.
4. Atik E, Taner T. Stability comparison of two different dentoalveolar expansion treatment protocols. Dental Press J Orthod 2017; 22(5):75-82. doi: 10.1590/2177-6709.22.5.075-08 2.oar
5. Balija ND, Aurer B, Meštrović S, Varga ML. Prevalence of Dental Anomalies in Orthodontic Patients. Acta Stomatol Croat 2022; 56(1):61-68. doi: 10.15644/asc56/1/7
6. Baron C, Houchmand-Cuny M, Enkel B, Lopez-Cazaux S. Prevalence of dental anomalies in French orthodontic patients: A retrospective study. Arch Pédiatrie 2018; 25(7):4 26-430. doi: 10.1016/j.arcped.2018.07.002
7. Cai Y, Du W, Lin F, Ye S, Ye Y. Agreement of young adults and orthodontists on dental aesthetics & influencing factors of self-perceived aesthetics. BMC Oral Health 2018; 18:113. doi: 10.1186/s12903-018-0575-6
8. Cao T, Xu L, Shi J, Zhou Y. Combined orthodontic periodontal treatment in periodontal patients with anteriorly displaced incisors. Am J Orthod Dentofacial Orthop 2015; 148(5):805-813. doi: 10.1016/j.ajodo.2015.05.026
9. Chapple ILC, Mealey BL, Van Dyke TE, Bartold PM, Dommisch H, Eickholz P, Geisinger ML, Genco RJ, Glogauer M, Goldstein M, Griffin TJ, Holmstrup P, Johnson GK, Kapila Y, Lang NP, Meyle J, Murakami S, Plemons J, Romito GA, Shapira L, Tatakis DN, Teughels W, Trombelli L, Walter C, Wimmer G, Xenoudi P, Yoshie H. Periodontal health and gingival diseases and conditions on an intact and a reduced periodontium: Consensus report of workgroup 1 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Periodontol 2018; 89 Suppl 1:S74-S84. doi: 10.1002/JPER.17-0 719
10. Hodovanyi OV, Martovlos AI, Hodovana OI. Periodontal diseases and dentoalveolar anomalies and deformations in patients of different ages (state of the problem and ways to resolve it). Proceedings of the Shevchenko Scientific Society. Med Sci 2019; 55(1):10-30. doi: 10.25040/ntsh2019.01.02
11. Kaklamanos EG, Mavreas D, Tsalikis L, Karagiannis V, Athanasiou AE. Treatment duration and gingival inflammation in Angle's Class I malocclusion patients treated with the conventional straight-wire method and the Damon technique: a single centre, randomised clinical trial. J Orthod 2017; 44(2):75-81.
12. Khan SQ, Ashraf B, Khan NQ, Hussain B. Prevalence of dental anomalies among orthodontic patients. Pak Oral Dent J 2015; 35(2):224-227.
13. Laganà G, Venza N, Borzabadi-Farahani A, Fabi F, Danesi C, Cozza P. Dental anomalies: prevalence and associations between them in a large sample of non-orthodontic subjects, a cross-sectional study. BMC Oral Health 2017; 17(1):62. doi: 10.1186/s12903-017-0352-y
14. Naraghi S, Ganzer N, Bondemark L, Sonesson M. Comparison of post-treatment changes with and without retention in adolescents treated for maxillary impacted canines-a randomized controlled trial. Eur J Orthod 2021; 43 (2):121-127. doi: 10.1093/ejo/cjaa010
15. Panwar M, Jayan B, Arora V, Singh S. Orthodontic management of dentition in patients with periodontally compromised dentition. J Indian Soc Periodontol 2014; 18(2) :200-204. doi: 10.4103/0972-124X.131325
16. Roslan AA, Rahman NA, Alam MK. Dental anomalies and their treatment modalities/planning in orthodontic patients. J orthod Sci 2018; 7:16. doi: 10.4103/jos.JOS_37_18
17. Saloux A, Couatarmanach A, Chauvel B, Jeanne S, Brezulier D. Knowledge, attitudes and professional practices of ortho-periodontal care of adults: a cross-sectional survey in France. BMC Oral Health 2022; 22(1):142. doi: 10.1186/s1290 3-022-02177-3
18. Sim HY, Kim HS, Jung DU, Lee H, Lee JW, Han K, Yun KI. Association between orthodontic treatment and periodontal diseases: Results from a national survey. Angle Orthod 2017; 87(5):651–657. doi: 10.2319/030317-162.1
19. Tsichlaki A, Chin SY, Pandis N, Fleming PS. How long does treatment with fixed orthodontic appliances last? A systematic review. Am J Orthod Dentofacial Orthop 2016; 1 49(3):308-318. doi: 10.1016/j.ajodo.2015.09.020
20. Wishney M. Potential risks of orthodontic therapy: a critical review and conceptual framework. Aust Dent J 2017; 62 Suppl 1:86-96. doi: 10.1111/adj.12486